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The agroecological transition of agricultural systems in the Global South

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Chapter 15

What market dynamics for promoting an agroecological transition?

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In his seminal report on the right to food, O. de Schutter concludes that there is a need to change the world's farming systems to devise a more sustainable and equitable diet to feed the world's population. He advocates a transition to a diversified agroecology based on smaller farms that practise a less intensive agriculture and use fewer inputs (de Schutter, 2014). This recommendation is unequivocal: it confirms that agroecology is now recognized, and has moved from just being a model that is opposed to the Green Revolution to one that proposes an agricultural model that could and should be disseminated widely (IDAE, 2015). And yet, this agroecological transition is not easy to implement. Indeed, it calls into question, and even requires the discarding of, existing knowledge on food and farming practices that form the base on which our current agriculture model is developed.[1]

Ecology, the environmental sciences and some agronomy disciplines were the first to devise alternative production methods that relied on ecological processes to provide useful services for agricultural production (Ollivier and Bellon, 2013). Issues pertaining to the marketing of products of agroecology were explored later through the social sciences (economics, sociology, geography). These studies show that agroecology also relies on new market dynamics centred on the relocalization of productive systems and a proximity between farmers and consumers (growth of direct sales and short circuits) and on the development of new standards and certification systems (Allen, 2004; Guthman, 2004). For the last 15 years, sociology and geography studies have also pressed for a better consideration of the different ways food products are consumed and their linkages – or relinkages – with the way they are produced (Delfosse, 2003; Rieutort, 2011; Le Velly, 2017), which David Goodman (2004) describes as the consumption 'turn' in rural sociology. These developments in different disciplines have thus contributed to a gradual transformation of the levels of organization and of analysis of agroecology, going from the plot to the farming and food system (Wezel *et al.*, 2009).

1. In this chapter, we use the term 'agroecological transition' as defined in the book's Introduction.

Several experiments conducted at a local level closely tie processes for the ecologisation of farming systems with specific market dynamics. Identified as alternative food networks, these experiments are harbingers of new development models; they 'promise to make a difference' and propose new values (Le Velly, 2017). While the viability of these alternative systems is not in doubt, questions on their scalability and reproducibility remain largely unanswered. In addition, the adoption of agroecological practices generally entails additional costs for the farmer in terms of manpower, certification and monitoring. These additional expenses drive farmers to seek new and more profitable markets in search of clients who are willing to pay a premium for quality and the sake of the environment (Moustier, 2014). However, the link between agroecological farming practices and specific commercial ones is insufficiently documented.

This chapter aims to explore how agroecological products derive value from the markets, based on which organizational methods and specific market devices[2], and to what extent the latter contribute to the evolution of farming systems. A detailed look at representative cases will highlight the diversity of these marketing practices and draw lessons on the possibilities and limitations of these market devices, of their scaling up, and of the unlocking of existing farming and food systems.

Market devices to unlock farming systems

Studies on alternative food systems demonstrate their dynamism and creativity. The diversity of ways of marketing agroecological products that have been tried out by farmers and consumers, and their capacity for innovation and adaptation allows us to view these processes with optimism. However, these experiments are often accused of being not very reproducible, too restricted, too local, unscalable and unable to respond to the global challenges of agricultural production and food security.

Literature on the theory of socio-technical transition and its multi-level perspective (Geels, 2002; Geels and Schot, 2007) puts these limitations into perspective[3]. It proposes positioning the dominant agro-industrial food system (considered as the socio-technical regime) and these alternative practices (considered as niches) in a common analysis framework (Figure 15.1). The socio-technical regime is stable: it is based on a set of well-established standards, actors, policies, markets and research. Niches are created independent of the rules and dominant actors. In this approach, the niches are not disconnected from the model of transition, they are understood as incubation spaces (Geels, 2002), i.e. places to implement learning processes and to build new economic networks; they are intended to accommodate the creation and establishment of alternative systems (Meynard *et al.*, 2013). In the graphical representation of the socio-technical transition by Geels and Schot (2007), the niches gradually tend to integrate the dominant regime by making its

2. Consequently, we include in the term 'market device' all the trading methods and innovative practices for deriving value from agroecological products.

3. The transition theory focuses on major transformations that involve major breaks, impacting stakeholders, their modalities of engagement, and their practices. This theory emphasizes the social dimension, essential to the dissemination of technical innovations.

various dimensions evolve (standards, actors, knowledge, etc.). This representation emphasizes the transformative or non-transformative nature of these innovations vis-à-vis the dominant model.

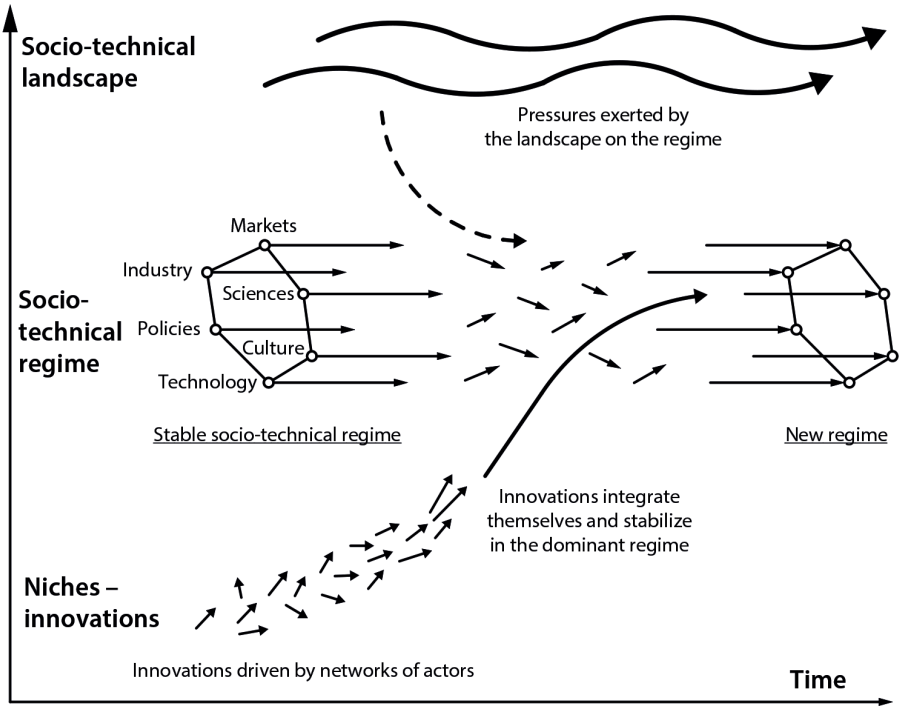

Figure 15.1. Analytical framework of the multi-level perspective of transition (Geels, 2002).

Transitions are considered here as the result of interactions between several levels: the socio-technical landscape that encompasses the environment in which society is situated; a stable socio-technical regime defined by rules, practices and interdependent actors which direct or limit the actions of operators; and niches which are spaces in which more radical innovations are built. The transition from one socio-technical regime to another is the result of pressures exerted by the landscape on the regime or the progressive integration of radical innovations (new rules, new practices) into the regime.

A good example to illustrate these dynamics is the recent institutionalization of participatory certification of organic products. Conceived by actors on the margins of the agro-industrial system (the regime), this practice was seen as an alternative or a counter-proposal to the third-party certification system. It is being gradually recognized by public actors and by consumers as a guarantee of agroecological production. In some countries, this alternative method has found approval in public regulations that oversee the certification of organic products in the dominant model (the socio-technical regime).

In this multi-level perspective of transition, policymakers can also consider several levers for action. Action on standards of the agro-industrial regime can be complemented by specific policy measures targeted at niche innovations: a credit programme for the creation of small-scale processing units in rural areas, for example, or logistical support for establishing open-air markets in urban centres.

Finally, the notion of the socio-technical regime introduces the idea of lock-in of farming systems (Box 15.1). While rules, standards and actors constituting the dominant system make it stable, they also result in its locking-in (Geels, 2004; Vanloqueren and Baret, 2009).

The illustration of this phenomenon in Brazil shows that a successful agroecological transition depends on several prerequisites and different types of innovations and mechanisms for unlocking the socio-technical regime. We can identify at least four of them.

First, a specific event is often seen to trigger the start of a process of agroecological transition. It may be an economic crisis (steep fall in the selling price of an agricultural product), illness of a farmer due to poisoning from the use of phytosanitary products, or the emergence of a socio-economic opportunity in the region: new processes for purchasing organic products, setting up of a public food procurement programme or a programme to procure vegetables grown with reduced chemical inputs, or agri-environmental measures included in an agricultural policy.

Second, consumer interest is another prerequisite. Since the 1990s, a profound change in the relationship between the consumer and his diet is reflected in the demand for agricultural products that are produced in a certain manner (sustainable, organic, farm-to-table, fresh) and/or that originate from specific geographical regions. A consumer's preference for geographic proximity indicates a form of support for local agriculture, a way to meet and come to know farmers or to minimize transport and

Box 15.1. An example of a socio-technical lock-in in Brazil

C. Cerdan

This lock-in effect can be illustrated by an example. In southern Brazil, many family farmers are part of agro-industrial chains to rear poultry or pigs or grow tobacco. A contract binds each farmer to the industry concerned. At the start of each season, these farmers receive agricultural inputs and commit to producing a set quantity of animals or tobacco leaves. The low income they obtain from this activity does not allow them to gain financial autonomy, thus keeping them in a cycle of dependence on the agro-industrial system. Moreover, regional specialization limits opportunities for diversifying activities. Indeed, existing knowledge systems, technical solutions provided by the research community or agricultural development institutions, and seasonal credit facilities are all oriented towards existing industrial production in the region. It is thus difficult for family farmers to break away from this system.

However, different kinds of policies can help unlock these systems. The policy of buying agricultural products from family farms and the programme to supply school canteens with such products represent substantial economic opportunities for some Brazilian farmers. They have thus been able to terminate their contracts with industry and reorient their farms to new products (fruits, vegetables, milk). It is important to note, however, that these reorientations have been strongly supported by social movements (NGOs) and by scientists and technicians seeking alternative development models for Brazilian regions (Mior, 2005).

storage costs for sustainable food systems (Moustier, 2017). Geographical proximity can also be seen as the reaffirmation of consumers' desire to protect food and cultural heritage. These developments are giving rise to the emergence and experimentation of new methods of purchasing food products. The consumer combines a range of methods and places to procure his food, alternating between supermarkets (distant and generic) and outlets that are closer (open-air markets, specialist shops, alternative purchasing networks such as AMAP, vegetable baskets).

Third, in order to practise agroecological or organic farming, the farmer has to involve himself in processes of learning and experimentation, on his own and/or collectively. In order to incorporate agroecological processes in his production system, the farmer requires new knowledge, a keen sense of observation, and a certain sensitivity to his environment. He also has to establish new trading relationships with consumers. Possible options include: becoming a member of an AMAP (community supported agriculture movement in France), delivering baskets of organic products directly to consumers, supplying to public procurement, becoming a member of a collective or a cooperative, selling in open-air markets, and forging new alliances with retailers. All of these require new organizational or institutional learning.

Fourth, and finally, it is not easy to change systems! Even though farmers do transform their farming systems altogether (e.g. tobacco farmers switching to vegetable farming in Brazil), years of specialization usually contribute to a loss of knowledge that has to be revived. This observation highlights how important it is for a farmer to involve himself in collective dynamics. Since the institutional and cognitive context is not always favourable to agroecological transition, the participation in the exchanges between farmers of experiences and knowledge is a key element in this transition. In many cases, the agroecological project in a territory allows the structuring of collective action, and more broadly, of building a vision of a shared future: what landscape, what environmental quality, what type of land use (Lamine, 2017)?

Detailed analyses of some successful experiments have revealed these prerequisites and necessary conditions for change. To further our deliberation on the agroecological transition, we advance the hypothesis that the contribution of these market devices (niches) to the evolution of the dominant system (socio-technical regime) and to the release of certain lock-ins depends on how the actors involved conceive of agroecology. It is necessary to better qualify these market devices and their position in relation to the agroecological transition. To this end, we describe, in some detail, seven experiments which demonstrate the diversity of the initiatives and the dynamics involved.

An overview of market devices for an agroecological transition

The initiatives we analyse here are organizational and/or institutional market innovations that modify the rules governing the trading of products. The case studies span different degrees of use of natural processes in lieu of chemicals, and include models based on organic and reasoned agriculture. Our reflection is based on information gathered from actors in the context of development projects in partnership in several

countries of the Global South (South Africa, Brazil, Laos, Madagascar, Morocco, Vietnam) and on the analysis of a diversity of documents (reports, articles, legal or regulatory documents, web sites and communications media). These projects bring together not only farmers and representatives of professional organizations but also representatives of research and rural development institutes.

Ecovida in Brazil: an agroecology network, breaking with the conventional agricultural model

Created in the late 1990s through the integration of local organizations already working to promote family farming and alternative technologies, the Ecovida organization today connects nearly 5000 family farms in 200 municipalities of the three southern Brazilian States. Farmers are divided into nearly 300 community groups, which make up 30 territorialized groups. This network also includes about 40 formal organizations: producer and consumer associations and cooperatives, and NGOs providing technical support.

The designers of the Ecovida network have defined common values that all prospective members have to subscribe to. The first is to promote the collective dimension at all levels, from the local to the regional. To be a member of the Ecovida network, one must be attached to a group in one's village or region. The second is the quest for an alternative to the dominant Green Revolution-based agricultural model, by fostering exchanges between farmers of their real agroecological experiences and their knowledge. The third attempts to bring consumers closer to farmers. While it is commonly accepted that farmers need to modify their ways of producing food, Ecovida believes that consumers also need to evolve by abandoning their 'Fordist'[4] approach and by trying to better understand the realities of the rural world. Fairs and open-air markets are seen as excellent settings to recreate a climate of trust and solidarity between producers and consumers. Prices are voluntarily controlled not only to avoid limiting the sale of organic products solely to affluent consumers, but also to dissuade the entry of new farmers and traders who are only driven by profit.

The promotion of institutional markets in Brazil (programme for the purchase of products from family farms, national school meals programme) and the actions taken by local organizations to increase the number of open-air markets were a first step to consolidate the transition of member farmer groups. This model, however, has its limitations. The local market and State procurement (school meals) cannot absorb an unlimited quantity of products. To address this problem, the Ecovida network created a sustainable road transportation programme with the aim of having trucks with fresh or processed agricultural products circulate between local groups. In this social innovation, all participants are members of the network and commit to buy or exchange (barter) products from other groups. This encourages the diversification of products offered in local markets and lowers transportation costs since trucks never return empty. In the interests of transparency and fairness, the terms of trade and volumes

4. Referring to mass consumption which manifests in the acquisition of a large number of products and goods at minimum cost.

are notified and accessible to all. Eight solidarity marketing circuits are currently in place and transport more than 74 different products, representing a volume in 2012 of 831 tonnes and a turnover of 1.5 million Reals (400,000 €).

Finally, the Ecovida network is best known for its involvement in the institutionalization of an alternative model of certification: the participatory guarantee system. At the very start, it opposed a third-party certification model (intervention of a certifying body) set up by the government of Santa Catarina because it considered that this model ignored the history of pioneering farmers and organizations that had already adopted organic farming methods in the region. Building alliances with partner countries in the Global South helped shape the participatory certification model. This quality assurance system certifies organic products on the basis of the active participation of the actors concerned. It is built on a foundation of trust, networks and exchange of knowledge (May, 2008).

The values of the Ecovida network are embedded in this alternative certification system, in particular the central role of the collective (as a guarantor of quality) and the importance of learning through the sharing of experiences and exchange of visits between peers. Ecovida's representatives were subsequently largely involved in formulating the Brazilian law on organic farming. Their experiences and activities have contributed to the statutory recognition of three organic farming certification modalities: third-party certification, the participatory guarantee system, and the organization of social control of direct selling (Law 10.831/2003).

In Morocco, a participatory system to build and manage an agroecology label

Following the emergence in 2004 of the concept of the participatory guarantee system, and its initial definition in 2008 by members of the International Federation of Organic Agriculture Movements (IFOAM), many local and international actors adopted this tool to promote agroecology. The use of these tools is advocated by NGOs and governments in many developing countries to support smallholder communities and help them obtain additional income through organic markets.

In Morocco, the organic farming label, as defined in Law 39-12 of 16 January 2013, is not yet available for producers since it has not yet been notified. Consequently, farmers who want to showcase the ecological nature of their farming systems currently use European and American labels. The high certification cost of these labels, however, makes the products unviable for sale within the country. Initial deliberations on a participatory guarantee system and the establishment of a local label began in 2011, within the Network of Agroecological Initiatives in Morocco (French acronym: RIAM), which was recently constituted as an association. The active members of this association are primarily agronomists, neo-rural farmers, and informed consumers, from the Moroccan or bi-national middle class. Aware of the environmental and public health problems that conventional agriculture in Morocco is generating, they considered it essential to establish a network to exchange views on agroecological practices and identify such farming systems. Starting in 2016, the network began supporting the establishment of eco-solidarity farmers' markets that promote agroecology in several Moroccan cities (Mohammedia, Casablanca, Marrakesh, Rabat).

Nevertheless, there is an urgent need for consumers to be able to count on a quality label and for farmers to adhere to a common set of specifications. Deliberations on the participatory guarantee system saw little success in 2011 as volunteers in the network could not devote enough time. However, the initiative finally saw the light of day thanks to an opportunity to enter into partnership with CIRAD in 2017, initially in the Rabat region. CIRAD used several participatory methods with the different actors concerned (farmers, consumers, grocers, restaurants, etc.) to help build a common reference base (Lemeilleur and Allaire, 2018). In addition to the creation of the guarantee model itself, which aims to progressively generate technical exchanges within local groups and during monitoring visits, these inclusive methods were used to create the reference base which led to an initial enrichment of collective knowledge and a strengthening of the local agroecology network. Some local institutions regard this tool as an opportunity to develop agroecology while waiting for (or in parallel with) an active public system. However, this interest indicates little about the public support that this alternative could receive in Morocco in the future.

Agreco in Santa Rosa de Lima, Brazil: organic farming aided by a basket of territorial goods and services

Agreco is an example of the success of a collective approach to agroecological production in Brazil based on a basket of goods [5]. This association was founded in 1996 in the context of an agricultural crisis which, combined with the isolation of remote farms, the rural exodus and the resurgence of health problems caused by the use of chemical inputs, led civil society and the local government to deliberate on novel solutions to stimulate the territory. Agreco is the result of a gamble: a supermarket chain owner, originally from the region, offered a few farmers exclusive spaces in his stores to sell their organic honey, fruits and vegetables. The gamble paid off: the move was very well received by consumers. The need to increase organic production pushed the association, initially confined to the Santa Rosa de Lima municipality, to expand into nine other municipalities. By 1998, Agreco included 211 families, 500 people and 26 family-owned small agro-industries (vegetables processing, sugarcane, dairy products, honey, preserves, eggs and bakeries). The strengthening of local institutions and the establishment of partnerships with the government allowed the association to diversify its area of activity.

Three successive periods stand out in the transition process. The first was the introduction of organic farming in the region and the building of a strong territorial identity. The second followed the beginning of organic farming with the development of agro-industries to process organic products. Processing of products was a factor in the viability of the experiment as it helped diversify the marketing of organic farming products. The arrival in retail markets of fresh and organic products from other producer organizations closer to the capital forced the Santa Rosa farmers to invest in processing of their products. Existing road infrastructure (dirt roads) prevented them from delivering fresh produce in good condition. This rapid development was achieved by mobilizing financial resources, accessible through the public support programme

5. Food products, fruit juices, and handicrafts sold in the area.

for family farming, the mobilization of a network of competent people, and the professionalization of farmers. The third period started when supply began to exceed demand. The project leaders had an ambitious and inclusive vision, with the goal of achieving a significant impact in terms of job creation and income for the region. It became necessary to look for ways to conquer new markets (supermarkets, school canteens, direct sales via the delivery of baskets of agricultural products to consumers) and to diversify activities in the region (farm stays, agro-tourism, training).

At the same time, other collective initiatives were being implemented to make the transition process sustainable, including the creation of a credit cooperative, a professionalization cooperative for sustainable development and a training centre. The products were certified by Ecocert-Brazil and bear the label of the Agreco collective. They are available in major supermarket chains in the main urban centres of Santa Catarina, as well as in São Paulo and Rio de Janeiro.

The proponents of the project have diversified their activities and services beyond the technical change represented by the introduction of agroecological (and especially organic) systems to grow fruits and vegetables. Producers and actors in the territory have acquired new skills, and have learned to think at the territorial scale and no longer at the limited scale of their farms. They have also invested in new forms of management and proposed new forms of territorial regulation. Today, they take on many collective responsibilities and play new roles in the public sphere. Two aspects stand out in this development: its inclusiveness, and acceptance of marketing channels and third-party certification. This certification was imposed by supermarkets in the capital, and the farmers chose to accept this imperative in order to maintain their presence in this market. In this case, scaling up resulted in a significant diversification of markets and activities.

'Clean' vegetables from the mountains of Vietnam

Since 2011, farmer groups have been created in Moc Chau district of Vietnam, in a mid-altitude zone (600-900 m) 150 km from Hanoi, to grow 'clean' vegetables to meet the needs of the capital, especially during the summer when the high temperatures and heavy rain of the Red River Delta no longer allow vegetable production. The city of Hanoi, heeding the demand of a growing urban population with increasing incomes and an insistence on food safety, was looking for new supply areas, since its peri-urban belt had become polluted and converted into a construction zone. An agri-chain for certified clean vegetables was started in Moc Chau under the auspices of a research and development project funded by ACIAR (Australian Centre for International Agricultural Research). The success of this approach was the result of several factors.

To begin with, farmers were trained in the methods of growing clean vegetables compliant with standards in force in Vietnam, either the VietGAP standard (a Vietnamese adaptation of the Global GAP standard) or the 'Clean Vegetables' standard (which is less stringent in terms of maintaining records), for growing tomatoes, cabbages, salads, beans, etc. Farmers benefited, in particular, from better quality seeds. The project ensured ongoing field monitoring as well as training in the practice of farm book keeping.

In addition, a market analysis was undertaken and a relationship established between Moc Chau farmers and distributors in Hanoi (supermarkets and specialized shops for safe products). In 2013, about 230 tonnes of vegetables were sold to supermarkets (Fivimart, Metro, Oceanmart) and specialty safe-product stores (BigGreen) in Hanoi (Sautier and Nguyen, 2016).

Moreover, a horizontal coordination was established between producers organized into interest groups and some producers belonging to cooperatives, as well a vertical coordination because of the strong commitment of local authorities in Moc Chau district and in the new district of Van Ho (created when Moc Chau was split into two separate districts, both in Son La Province) to develop this agri-chain. Consumers, collectors and distributors were also involved in discussions on developing the agri-chain, and were invited to various on-site project meetings.

Finally, Moc Chau was promoted as an origin of clean vegetable production by registering a certification trademark that combined the Moc Chau origin with an adherence to the VietGAP agroecology and Clean Vegetables standards. Although Vietnam has legislation on geographical indications and more than 60 GIs were registered in 2018, the absence of a specific sensory quality of vegetables grown in Moc Chau, due in part to the very recent cultivation of vegetables in this area and the large number of vegetables involved (19) tipped the choice in favour of a certification trademark. Indeed, the certification trademark ensures the adherence to the rules of production by a quality and certification system implemented by the owner of the mark, who himself is not a producer. The collective mark, another instrument available in Vietnamese law, requires the existence of a single collective association of all vegetable farmers, which is not the case here since the farmers are organized in several different groups.

In 2017, Vietnam witnessed the registration of 181 certification trademarks by local authorities at the district and provincial levels to promote their products (source: National Office of Intellectual Property, NOIP), such as the certification trademark 'Da Lat Safe Vegetables'. Da Lat is a region of southern Vietnam known for its vegetable production and serves as a model for the development of the vegetable chain in Moc Chau. The mark's owner is the local authority which is responsible for quality control for all the farmers. In the case of Moc Chau's certification trademark, the logo includes the name 'Moc Chau Safe Vegetables' in Vietnamese and English, together with an image of the mountains of this district, best known for its tea and dairy products. Registered in 2016 by the National Office of Intellectual Property in the name of the People's Committee of Moc Chau district, the regulations governing the use of the trademark (Decision 345/2014/QD-UBND of 18 September 2014 of the People's Committee of Moc Chau district) provides that it may be used for vegetables grown in the demarcated area of the districts of Moc Chau and Van Ho and which comply either with the Clean Vegetables standard (circular 59/TT-BNNPTNT of 9 November 2012 of the Ministry of Agriculture and Rural Development) or the VietGAP standard. Compliance with these standards is monitored by the National Agro-Forestry-Fisheries Quality Assurance Department (NAFIQAD), the Department of Agriculture and Rural Development (DARD) of Son La Province (Marie-Vivien and Vagneron, 2017), or any other

certification body accredited for VietGAP. The DARD of Moc Chau District is responsible for managing the 'Clean Vegetables' trademark and authorizes farmers in Moc Chau and Van Ho to use it, organizes the random collection of samples for laboratory tests, and monitors the origin of the vegetables to verify that they indeed come from the defined production region.

The logo has already been used on vegetable packaging for several years now. This however does raise the issue of the use of packaging pollution, since vegetables are traditionally sold loose and in bulk. This also explains why the outlets are primarily supermarkets and specialty stores.

The project's second phase got underway in 2017 and aims to expand this certified 'Clean Vegetables' chain to more producers, in addition to the 50 or so producers in three pilot villages who already form part of it, including producers cultivating vegetables using conventional methods and to those shifting from growing maize to clean vegetables. While the latter is turning out to be more remunerative as demand from urban consumers is growing exponentially, it does require a genuine and dual know-how on growing vegetables and on reasoned agriculture. This expansion will help establish Moc Chau's reputation as an agroecology region, developed through the use of a trademark. The agroecological attributes will replace the organoleptic qualities to establish the geographical reputation of an agri-chain.

Developing agroecological farming in Madagascar through home delivery of vegetable baskets

In Antananarivo (Madagascar), peri-urban agriculture supplies the bulk of the vegetables consumed in the metropolis. The traditional food cultivation system dominates and encompasses more than 50,000 family farms in the greater peri-urban belt[6] and a dense network of collectors, wholesalers, semi-wholesalers and retailers supplying urban markets. This model faces the challenge of urban growth: unceasing increase in demand, growing pressure on land use, and urban pollution affecting agriculture. Market garden products are especially affected by health-related quality issues (excessive and poorly regulated use of chemical inputs) and losses due to vegetable spoilage when the supply chain does not work smoothly enough. During recent years, a rare few private agroecological vegetable garden projects have emerged. Their proponents are mainly entrepreneurs from Europe catering to an affluent segment of the population.

For more than a decade now, in order to promote small-scale family farms, which represent the bulk of the farming systems in the Malagasy Highlands, NGOs – most notably Agrisud International, Agronomists and Veterinarians Without Borders, and FERT (Training for the Development and Renewal of the Earth) – have been helping develop and disseminate agroecological practices in the market garden sector. The objective of growing healthy (clean) vegetables is tied to that of increasing the income of farmers, struggling with very low land availability (between 5 and 16 ares for market gardening per farm for the majority of them), and of improving the supply to urban consumers in terms of quality, quantity and diversity.

6. 2004/2005 Census of Agriculture for Madagascar, Analamanga Region.

Agrisud has been involved since the beginning of 2015 in an agroforestry support programme around Antananarivo within the framework of a European funding programme. The process involves educating a thousand agroecological farmer leaders, nearly half of whom have already been trained to pass on these techniques to other farmers in their areas, as part of an effort to train a total of 5000 farmers in four years. At the same time, around 50 local collectors have benefited from support for working capital and management capacity building. One of the downstream objectives is to reduce the number of intermediaries and derive increased value from agroecological products in order to improve the margins of producers. To begin with, two sales outlets were set up to showcase the uniqueness of their products. Very soon, given the low volumes sold at these points of sale, a pilot system of vegetable baskets and home delivery was established.

Moreover, coordination structures (local organizations) are being set up since the end of 2017 to improve the link between farmers and traders supported by the project. The aim is to connect a group of a dozen or so farmers with one or two collectors, in order to ensure a smooth supply chain and allow traceability of product quality. In each of these devices, farmers and traders jointly draw up an action plan with the help of technicians to fix crop schedules for the coming months and the requirement in seeds, small equipment and, where necessary, training. These devices were designed to become pivotal points within a short time between the project and the beneficiaries, and progressively empower farmers and collectors. These collectives are at the heart of technical learning processes, with an increase of the know-how of farmers and trainers and the exchange of experiences between members. These collective-action learning processes, involving farmers and collectors, not only concern agronomic skills but also the capability to take advantage of and develop market opportunities. Thus, for example, based on suggestions by collectors and the possibility of obtaining quality seeds through the project, farmers have introduced hitherto rarely cultivated niche vegetables (e.g. red cabbage, broccoli, Nappa Chinese cabbage) in their cropping seasons.

The issue of qualifying and classifying the products arises during the transition to agroecological production, which requires a progressive mastery of the practices involved. A participatory guarantee system was initiated on the basis of individual production datasheets provided by the farmer to downstream actors. This system is, however, being found to be too complex to implement and is being modified to promote a more general appreciation of quality at the level of local organizations.

The approach was initiated recently and the process is underway. From an organizational point of view, the challenge for the devices is to fine-tune the degree of mutual commitment, in a context in which an overly restrictive contractualization would most likely be impractical, given the numbers and diversity of buyers and sellers. Another challenge is to adapt to local geographical specificities: on the one hand, the priority in the areas closest to the city and the markets is to improve the food safety of the products since the supply chain is relatively smooth and, on the other, the more isolated production areas have fewer problems concerning pollution and urbanization but are hampered by access related issues – which could be eased through a more effective coordination with downstream actors. A third challenge is to adjust

the guarantee level and product image based on the degree of technical mastery by farmers and awareness by target markets of the benefits of agroecological products. Indeed, the challenge is not only to provide products that are free of chemical residues, but to also ensure a diversified and widespread supply that is accessible to all, and not solely to the more affluent sections of the population. In a context in which problems pertaining to the health quality of the products are evident, but where the consumer's awareness of them is only gradually developing, the relatively flexible concept of agroecology makes it possible to gradually improve the quality of the products by reducing major sanitary risks while not totally banning the use of chemical pesticides.

The institutionalization of organic farming in Laos

A small landlocked nation included in the category of the least developed countries, Laos is almost an exception in Southeast Asia because it instituted a comprehensive institutional framework for the development of organic agriculture in the mid-2000s. In 2004, the PROFIL project (Promotion of Organic Farming and Marketing in the Lao PDR), supported by the Swiss NGO Helvetas and the Laotian Ministry of Agriculture and Forestry, laid the foundation for organic farming by setting up the first groups of organic rice and vegetable farmers (2004); the first national standards for organic agriculture based on the standards proposed by the International Federation of Organic Agriculture Movements (2005); the first farmers' market (2006); a national certification authority (Lao Certification Body); and the Clean Agriculture Development Centre (2008) which aims to promote different forms of sustainable agriculture.

As far as public policies are concerned, the 2011-2020 Agricultural Development Strategy in Laos highlights the potential of organic farming for smallholders while the 2006-2010 and 2011-2015 national socio-economic development plans promoted sustainable agriculture (good agricultural practices, organic farming) as a way of improving the environmental and social performance of agriculture while integrating poor family farmers into high value-added chains. In 2014, Laos adopted a National Strategy for Organic Agriculture and in 2015 a National Strategy for the Development of Organic Agriculture. This enthusiasm is not exclusive to undertakings by the Ministry of Agriculture and Forestry, but also results from several collaborations between the Laotian government and international organizations (Asian Development Bank, FAO), bilateral development agencies (Japan International Cooperation Agency, JICA), international NGOs (Oxford Committee for Famine Relief, OXFAM) and national NGOs (Sustainable Agriculture and Environment Development Association, SAEDA) within the framework of more or less well-coordinated and articulated development projects.

According to the ministry, nearly 8000 hectares of cultivation surface areas were certified as organic in 2016. Of this, 81% were certified by the Lao Certification Body and 19% by ACT (Thai certification body accredited to provide certification of international standards). Rice accounted for 58% of the certified cultivation area and coffee (the main export crop) representing 9% of the total area certified by the Lao Certification Body, and almost 45% of the total area certified by ACT.

As the national certification agency is not accredited to provide certifications of international standards, the national market is a major outlet for domestic rice production and, in particular, for vegetable production. The Vientiane organic farmers' markets are organized by a committee appointed by the ministry and made up of representatives of organic farming producer groups from several districts of Vientiane (Saysettha, Sikhottabong, Sisattanak and Xaythany). These ministry-certified groups produce and market about 220 tonnes of vegetables per year. They also make organic fertilizer, plant fruit trees and organize training sessions for their members.

Sales of organically grown products in farmers' markets have increased significantly in recent years: the turnover of the market in That Luang has risen from about 25 million Laotian kip (LAK)/day in 2008 (1900 €) to 35 million LAK/day in 2012 (3250 €). In 2016, the total volume of vegetables sold at That Luang market was estimated at 4 to 5 tonnes per day during the rainy season and 8 tonnes per day during the dry season (Manivong *et al.*, 2016). Farmers' markets were also set up in Xieng Khouang Province in 2011, under the auspices of local agricultural services and a local NGO (SAEDA), and at Luang Prabang, on the initiative of the Tabi project (The AgroBiodiversity Initiative) and provincial agricultural services.

In 2015, a FAO-funded regional project promoted participatory guarantee systems to help smallholders benefit more from the growth of organic farming. These systems are intended to help producers build a relationship of trust with consumers, forge links with the local market, and participate in collective selling. The government is offering keen support to the implementation of these guarantee systems, which it has recognized. Farmers were allowed to use the national logo (Figure 15.2) and are supported by an active involvement of ministry officials at the local level.

Figure 15.2. The national logo for organic farming in Laos.

Even more recently, other initiatives such as the direct sale of organic vegetable baskets have sprung up around Vientiane. Such diverse initiatives illustrate the role played by alternative market devices in the development of organic farming in Laos. They are based on a growing demand by the local population for food that is healthy and of good quality and demonstrate that, in the absence of access to export markets, a local market can be developed by strengthening the links between farmers and consumers and on the basis of collective learning processes at the local level.

Rooibos: a geographical indication to derive value from agroecological practices in South Africa

The rooibos case study illustrates how geographical indications (GIs), which are based on a local process of codification of practices, offer tools to derive value from agroecological

systems. The rooibos plant, endemic to South Africa's fynbos (a dry savannah ecosystem, rich in endemic biodiversity), generally characterizes the landscape where it is grown and the local economy. The primary goal of creating a GI for rooibos in the mid-2000s was to respond to the threat of misappropriation of its name.[7] Cultivated in South Africa since the 1930s, this plant was initially commonly consumed within the country, but is also being exported since the last 20 years to a growing number of countries. Combining indigenous Khoikhoi and Afrikaner practices, it is deeply rooted in South African heritage and represented an emblematic product for launching GI initiatives in this country. Supported by local and international research actors (University of Pretoria and CIRAD) as well as by Western Cape province's Department of Agriculture, the actors of this agri-chain worked together to establish a GI and to have it recognized by the State as well as by the European Union. The latter indeed constitutes an important market for this product, and a GI recognition there is considered by the actors of the chain as the surest guarantee of protection of their product and its name. A long negotiation process was undertaken to establish its specifications.

Since the GI pertains to the name of a product already sold by all the farmers, the discussion was widened to encompass all the practices concerned. Rooibos, a crop traditionally cultivated extensively has, over the last 20 years, witnessed a significant expansion of its cultivation area in conjunction with a marked intensification of its agricultural practices. In response, external actors devoted to environmental issues are rallying to conserve biodiversity. They encourage farmers to reduce the environmental impact of rooibos cultivation, mainly by labelling their practices. At the same time, negotiations on the GI specifications have shown that, for this agri-chain's actors, the challenge is more than just protecting the name. Indeed, the recent dynamics of expansion and intensification threaten both the quality of rooibos and the biodiversity that is an integral part of its production area. This is resulting in the inclusion of the labelling approach recommended by the environmental actors into deliberations on GI, and the use of the GI to incorporate biodiversity management issues in the practices to be developed and showcased. This inclusion of biodiversity issues in negotiation on the specifications helps better qualify the various practices and their impacts. The position that prevailed initially of adopting a minimal set of specifications, reflecting the desire to include as many actors as possible, was thus abandoned. Various agroecological practices are included in the specifications, contributing to a better qualification of rooibos: e.g. establishment of corridors in the farms for monoculture rooibos farmers cultivating more than 50% of their land, with rows of vegetation dividing the cultivated fields.

The process of establishing the GI as a locally negotiated and market-sanctioned standard is opening up local mediation spaces (Biénabe *et al.*, 2009). Using the local negotiation process, the agri-chain's actors and those promoting environmental issues have explicitly described the links between product quality and agroecological processes in production systems, playing a key role in the recognition and

7. Several South African actors involved in selling rooibos on export markets have reported instances of misuse of the name. An American cosmetics company, Annique, manufacturing rooibos-based goods registered the trademark 'Rooibos' in 1994.

dissemination of agroecological practices, on the one hand, at the time of establishing the standard (socialization of practices) and, on the other, through its implementation following the registration of the GI.

However, two points are to be noted in the process of deriving value from agroecology with the help of a geographical indication. Agroecological practices must clearly be seen as contributing to the quality or reputation of the product developed using the GI in order to be legitimately incorporated in the specifications. That said, agroecology's contribution can vary widely depending on the products and the territories concerned, and that is why it is essential that the standards associated with the GI be drafted at the local level. It is also important to note that the process for creating the GI for rooibos spanned several years and is the result of the effective participation of a wide range of actors involved directly or indirectly in the agri-chain. Indeed, while the rooibos inter-professional body was the driving force behind the effort, it was supported by research actors with expertise in GIs, NGOs providing support to smallholders, and actors involved in environmental issues. The participation of all stakeholders and the availability of settings that are conducive to debate and collective arbitration is important for GIs to be able to incorporate the complexity of the issues involved and to promote specific localized and agroecological production systems over time.

Key lessons from these experiences

The above experiments confirm that agroecology is not a predefined structure but a diversified creation because of its multiple uses and users, as well as its very many variants.

The seven cases studied show the link between agroecological practices (in organic or reasoned agriculture) and commercial value obtained through a variety of marketing channels used to reach end consumers (Table 15.1): direct sales to the consumer, farmers' markets or home delivery, or through quality-conscious retailers such as supermarkets, specialty stores, mass catering, or exporters. These initiatives are also backed by quality certification schemes.

Table 15.1. Commercial value and quality control of agroecological practices.

	Type of production	Marketing	Quality control
Ecovida, Brazil	Agroecology	Farmers' markets, mass catering	Participatory guarantee system
Riam, Morocco	Organic farming	Eco-solidarity markets	Participatory guarantee system
Agreco, Brazil	Agroecology	Supermarket, direct sales, agritourism	Ecocert
Moc Chau, Vietnam	Reasoned agriculture	Supermarkets, specialty stores	Certification trademark
Agrisud, Madagascar	Agroecology	Baskets	Participatory guarantee system
Bio, Laos	Organic farming	Farmers' markets	Laos Organic Certification
Rooibos, South Africa	Reasoned agriculture	Export to Europe	GI

In addition, agroecological approaches are characterized by political discourse, slogans, the ideological positioning of the actors who support it and their practices. Simply put, an initial approach to agroecology rests on principles based not only on the management of ecological processes to produce environmental services, but also on social dimensions (Baret, 2017). This form of agroecology – also called 'strong agroecology' – represents a clean break from the conventional development model as it relies on alternative food systems that are in opposition to the dominant model. In contrast, 'weak agroecology' is often criticized by proponents of the 'strong agroecology' model as they view it as a simple 'greenwashing' of conventional agriculture through the adoption of a few practices, without the adoption of the fundamental principles of agroecology. This adaptive conception of the agroecological transition incorporates practices aimed at greater environmental sustainability, but does not call into question the existing socio-technical regime. The recommendations essentially focus on new or corrective practices aimed at reducing the environmental impact of certain production systems.

The analysis of these different market insertion experiences confirms this diversity of situations in relation to the size and objectives of the groups involved, the values they champion, and their modality and degree of institutionalization (Box 15.2 and Figure 15.3).

GIs are aligning themselves with the changing global context and consumer demand; for example, issues of sustainability are being increasingly included in their own right in the GIs' specifications, as seen in the case of rooibos. In addition to including certain rules in favour of an agroecological transition, GI professionals promote actions that support environmental preservation and that derive value from the local heritage (Ollagnon and Touzard, 2007). More recently in France, in order to support the French national policy on agroecology pushed by the Ministry of Agriculture, INAO[8] and the Institute of Vine and Wine Science have developed a guide for good agri-environmental practices. The guide provides technical benchmarks for all wine-makers who would like to, individually or collectively, change their practices in order to initiate or deepen an agri-environmental approach (INAO, 2017). Without taking anything away from the efforts made by the agri-chain, this guide is representative of what is meant by adaptive agroecology or weak agroecology in an agri-chain in which there was a strong opposition between GIs and organic farming. This approach is aimed primarily at organizations that manage GIs.

We can also identify, in this typology, the market devices used by farmers and public actors and/or NGOs. We can note here the recent phenomenon in many countries of more and more local authorities, cities and urban areas investing in the food and agricultural sectors. The challenge for these administrators is to ensure food security for their populations (urban as well as rural) and to improve the sustainability of the urban or regional food systems by taking the environmental, social and economic impacts into account. The most commonly used levers for action are a support for

8. The National Institute for Origin and Quality (in French: *Institut national de l'origine et de la qualité, INAO)* is the French government organization responsible for regulating French agricultural products with Protected Designations of Origin.

Box 15.2. Diversity of marketing devices claiming to be part of agroecology

C. Cerdan, E. Biénabe, H. David-Benz, S. Lemeilleur, D. Marie-Vivien, I. Vagneron, P. Moustier

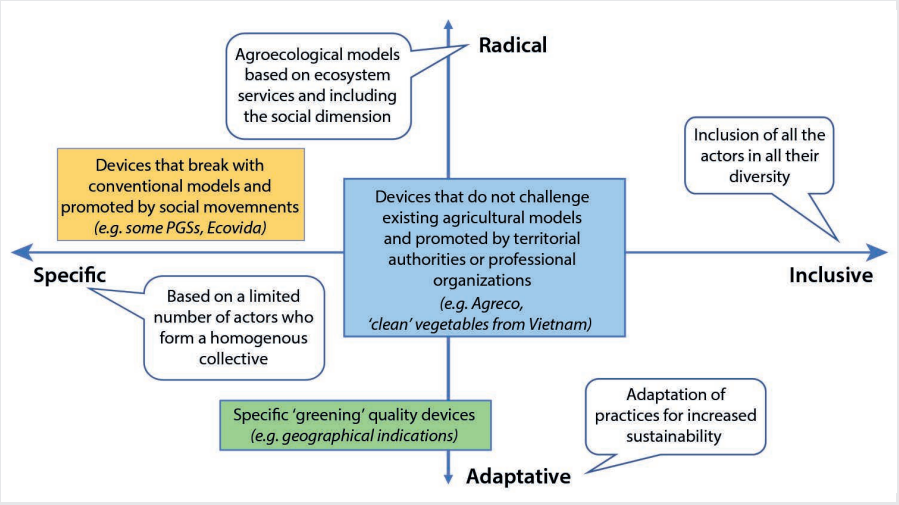

Figure 15.3. Diversity of marketing devices claiming to be part of agroecology (based on Baret, 2017).

In the 'radical and specific' quadrant, we find market devices used by a relatively small group of homogeneous actors. These actors' approach is based on a serious challenge of existing production systems and the promotion of new interactions between farmers and consumers. These devices call for a total break from conventional agricultural development models and the distribution channels associated with them. Their proponents include social movements and activists (the Ecovida network).

In the 'adaptive and inclusive' quadrant, we find devices that do not fundamentally challenge existing agricultural development models. We first classify the methods adopted by producers and private actors. In order to build and expand their range of organic products, supermarkets come closer to producer organizations. This alliance with the distribution sector represents an economic opportunity that motivates farmers to initiate an agroecological transition. The Agreco association in southern Brazil is an example.

The final case belongs in the **'specific and adaptive' quadrant** and concerns geographical indications (GI). In their original conception, GIs do not, in themselves, aim to promote agroecology. They are intellectual property rights that value and protect local products. However, they can also be tools for governance, exercising a significant influence on local innovation processes (Belmin, 2016) and can have a significant impact on agricultural transitions through the development of specific local resources in certain territories. GI and organic farming, or other types of eco-friendly certification, have long been regarded as quality indicators that can be complementary. A farmer can sell his product under a GI tag along with an organic label, adapting his production system to meet both specifications.

wholesale and open-air markets and their logistics (new regulations, infrastructure), catering programmes, and relocation policies for food supply (planning of peri-urban agricultural areas, establishment of rules and contracts, information systems). Procurement platforms for local products (virtual or otherwise) facilitate meetings between public actors and suppliers of local organic and non-organic products. The development of institutional markets and school meal programmes is also part of these dynamics. New policies, such as those concerning Brazil's Zero Hunger programme or those in several African countries, are examples of how to include organic products in school meal menus.

Conclusion

This chapter has shown the importance of market dynamics in the agroecological transition. The search for new markets, the willingness of producers and the evolution of their production systems are some elements that we have been able to identify through the experiments described here. It is important to highlight the wide range not only of market insertion modalities but also of the projects that the promoters of agroecology have used as vehicles for their experiments. Resituating these initiatives in the design of a socio-technical transition and its multi-level perspective (Geels and Schot, 2007) reveals three elements for further reflection.

First, an initiative's scaling capacity or the ability to evolve depends on the underlying project. Different types of situations have been observed. Initiatives (niches) evolve towards the dominant socio-technical regime and contribute to its evolution. This is the case of the institutionalization of agroecology or participatory guarantee systems (Morocco, Laos, Agreco Brazil, Rooibos GI). In other cases, the promoters maintain a strong opposition to the dominant regime. These experiments can evolve and can scale up (move from the local market to the national market) but remain distinct from the dominant regime. Ecovida is a niche that is becoming stronger and spreading out without integrating into the dominant system, while maintaining these values (break with the conventional model, refusal to enter into alliances with large retailers).

Second, the institutionalization of quality labels is based on the establishment of rules that structure social interactions, 'defining who can participate in the market, what goods are part of the transactions, how trading should take place, and what are the rights and obligations of each economic agent' (Niederle and Gelain, 2013; with reference to Hodgson, 2006, see Marie-Vivien and Biénabe, 2017). The institutionalization of agroecology or quality assurance modalities and the role of the State in the process play an important part in stimulating innovation and offering opportunities to territorial and producer organizations to explore new forms of production.

Third, the study shows the linkages between agroecological practices (in organic or reasoned farming) and market value that seek to build a relationship with the end user. These initiatives are also backed by quality certification schemes.

Finally, we note that the presence of different models of agricultural development and the coexistence of a plurality of trading devices based on different rationales and political projects favour agroecological transitions and transformations of food systems.

References

Allen P., 2004. Together at the Table: Sustainability and Sustenance in the American Agrifood system, Penn State University Press, United States, 272 p.

Baret P., 2017. Quelle approche système pour construire des trajectoires de transition. In: Conférence au Colloque de clôture du projet Format. Coexistence des modèles agricoles et alimentaires : un nouveau paradigme du développement territorial ? INRA, CIRAD, Paris, 29 June 2017.

Belmin R., 2016. Construction de la qualité de la clémentine de Corse sous indication géographique protégée : Analyse des pratiques agricoles et du système socio-technique, thesis, Pascal Paoli University of Corsica, Corte.

Biénabe E., Leclercq M., Moity-Maïzi P., 2009. Le rooibos d'Afrique du Sud : Comment la biodiversité s'invite dans la construction d'une indication géographique. Autrepart, 50 (2), 117.

de Schutter O., 2014. The transformative potential of the right to food, Final report A/HRC/25/57, United Nation, Geneva. https://www.ohchr.org/EN/HRBodies/HRC/RegularSessions/Session25/Documents/A_HRC_25_57_ENG.DOC (retrieved 19 March 2019).

Delfosse C., 2003. Géographie rurale, culture et patrimoine. Vol. I : Texte de synthèse. Mémoire pour le diplôme d'Habilitation à diriger des recherches en géographie, Lille 1 University.

Geels F.W., 2002. Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. Research Policy, 31 (8-9), 1257-1274.

Geels F.W., 2004. From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. Research Policy, 33 (6), 897-920.

Geels F.W., Schot J., 2007. Typology of sociotechnical transition pathways. Research Policy, 36, 399-417.

Goodman D., 2004. Rural Europe redux? Reflections on alternative agro-food networks and paradigm change. Sociologia Ruralis, 44, 3-16.

Guthman J., 2004. Agrarian Dreams: The paradox of organic farming in California, Berkeley, University of California Press, Berkeley, United States, 328 p.

Hodgson G., 2006. What are institutions? Journal of Economic Issues, 40 (1), 1-25.

IDAE, 2015. Institutionnalisation des agro-écologies, appel à projet générique ANR, Paris, France.

INAO, 2017. Guide de l'agro-écologie en viticulture : Développement des mesures agroenvironnementales, INAO IFV, Paris, France.

Lamine C., 2017. La Fabrique sociale de l'écologisation de l'agriculture, éditions La Discussion, Marseille, 225 p.

Lemeilleur S., Allaire G., 2018. Système participatif de garantie dans les labels du mouvement de l'agriculture biologique : Une réappropriation des communs intellectuels. Économie rurale, 365.

Le Velly R., 2017. Sociologie des systèmes alimentaires alternatifs : Une promesse de différence, Presses de l'École des mines, Paris, 197 p.

Manivong V., Sonethavixay S., Wongpit P., Vagneron I., 2016. Fair deal or ordeal? Enquiry into the sustainability of commercial banana production in the Lao PDR. In: AC and SD 2016 – Agri-Chains and Sustainable Development: linking local and global dynamics. Montpellier: CIRAD, pp. 106-108. International Conference on Agri-Chains and Sustainable Development, Montpellier, France, 12 December 2016/14 December 2016. http://acsd2016.cirad.fr

Marie-Vivien D., Biénabe E., 2017. The Multifaceted role of the state in the protection of geographical indications: A worldwide review. World Development, 98, 1-11.

Marie-Vivien D., Vagneron I., 2017. One size fits all or tailor-made? Building appropriate certification systems for geographical indications in Southeast Asia. World Food Policy, 4 (1), 105-126.

May C., 2008. How Participatory Guarantee Systems can develop and function. IFOAM, Germany, 36 p.

Meynard J.M., Messéan A., Charlier A., Farès M., Le Bail M., Magrini M.B., Savini I., 2013. Freins et leviers à la diversification des cultures, étude au niveau des exploitations agricoles et des filières, synthèse du rapport d'étude, INRA, Paris.

Mior L.C., 2005. Agricultores familiares, agroindústrias e redes de desenvolvimento rural, Argos, Chapeco, Brazil, 338 p.

Moustier P., 2014. Valorisation commerciale d'une agriculture commerciale de proximité. In: Conception de systèmes horticoles innovants (P.-Y. Lauri, ed.), Bouayes, Formatsciences, 233-245.

Moustier P., 2017. Short urban food chains in developing countries: Signs of the past or of the future? Dossier L'Agriculture dans le système alimentaire urbain : continuités et innovations. Nature, sciences, sociétés, 25 (1), 7-20.

Niederle P., Gelain J., 2013. Geographical indications in Brazilian food markets: Quality conventions, institutionalization and path dependence. Journal of Rural Social Sciences, 28 (1), 26-53.

Ollagnon M., Touzard J.M., 2007. Indications géographiques et développement durable, enquête nationale sur les actions des organisations de gestion locale des indications géographiques, INRA UMR Innovation, Montpellier.

Ollivier G., Bellon S., 2013. Dynamiques paradigmatiques des agricultures écologisées dans les communautés scientifiques internationales. Natures, sciences sociétés, 21 (2), 166-181.

Rieutort L., 2011. La géographie française et la question rurale. In: Dynamiques des espaces ruraux dans le monde, Armand Colin, Paris, 17-45.

Sautier D., Nguyen T.T.L., 2016. Strengthening an emergent horticulture cluster in Vietnam: Interest group and certification trademark. ISHS Acta Hortic., 1128, https://doi.org/10.17660/ActaHortic.2016.1128.13.

Vanloqueren G., Baret P.V., 2009. How agricultural research systems shape a technological regime that develops genetic engineering but locks out agroecological innovations, SSRN scholarly paper ID 1417009, Social Science Research Network, Rochester.

Wezel A., Bellon S., Doré T., Francis T., Vallod T., David C., 2009. Agroecology as a science, a movement and a practice: A review. Agronomy for Sustainable Development, 29 (4), 503-515.